Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (*Currently amended*) Method of ~~analysis of~~ analyzing ions using a quadrupole ion trap having four pole rods and a field frequency Ω, the method comprising:
a) introducing ions into the quadrupole ion trap;
~~by radial or axial mass-to-charge-selective ejection of~~ (b) mass selectively ejecting ions from ~~an rf~~ the quadrupole ion ~~trap consisting of four pole rods, the field having freqency Ω, wherein the ejection of ions is supported by nonlinear resonances set up by superposition of~~ by superimposing higher multipole fields on the field of the ion quadrupole trap that result in nonlinear resonances; and
(c) detecting the ejected ions.

2. (*Currently amended*) Method according to Claim 1 wherein the ~~nonlinear resonance is produced by a superposition of higher "odd" multipole fields, and wherein the nonlinear resonance at Ω/3 is used for~~ ejection of the ions is started by a dipolar excitation of frequency ω, where ω is an integer fraction of the frequency Ω or a small multiple thereof.

3. (*Currently amended*) Method according to Claim 2 wherein ~~higher "even" multipole fields are superimposed simultaneously~~ the frequency ω is equal to Ω/3.

4. (*Currently amended*) Method according to Claim 1 wherein the higher multipole fields ~~are produced mechanically by a dislocated arrangement or unsymmetric shaping of the parallel pole rods~~ comprise higher "odd" multipole fields and/or higher "even" multipole fields.

5. (*Currently amended*) Method according to Claim ~~1~~ 4 wherein the higher ~~"odd"~~ multipole fields ~~are produced by unequal amplitudes of the driving voltage at opposing pole rods~~ comprise at least a hexapole field and an octopole field.

6. (*Currently amended*) Method according to Claim ~~5~~ 7 wherein ~~the ratio of the driving voltage~~ amplitudes ~~at opposing~~ of the additional voltages applied to pole rods are adjusted to the scanning rate.

7. (*Currently amended*) Method according to Claim ~~1~~ 4 wherein the higher multipole fields are ~~produced~~ generated by ~~a dislocated~~ dislocating the arrangement of the pole rods ~~and by unequal amplitudes of the driving voltage at opposing pole~~.

8. (*Currently amended*) Method according to ~~Claims 1~~ Claim 4 wherein the ~~ions are brought into nonlinear resonance by a dipolar excitation field~~ higher multipole fields are generated by shaping pole rods asymmetrically.

9. (*Currently amended*) Method according to Claim ~~8~~ 4 wherein the ~~dipolar excitation field is at the same frequency as the nonlinear resonance~~ higher multipole fields are generated by applying additional voltages of frequency Ω to the pole rods.

10. (*Currently amended*) Method according to Claim ~~9~~ 2 wherein the phase of the dipolar excitation ~~field~~ is locked to the phase of the ~~frequency of the driving radio frequency voltage~~ field of the ion quadrupole trap, and wherein the phases are adjustable in relation to one another.

11. (*Currently amended*) Method according to Claim 1 wherein the ions are ejected ~~radially through a slit in one of the pole rods~~ orthogonally and/or axially to the pole rods.

12. (*Currently amended*) Method according to Claim 1 wherein the ~~ions are ejected axially through at least one apertured diaphragm at the end of the rod system~~ quadrupole ion trap is filled with a damping gas prior to the mass selective ejection.

13. (*Currently amended*) Method according to Claim ~~12~~ 2 wherein ~~a~~ the dipolar excitation ~~field~~ is ~~produced~~ partially or entirely generated by splitting an apertured diaphragm on the front of the ~~rod system~~ pole rods and ~~connecting one phase each of the excitation~~ applying a voltage of frequency ω to each half of the diaphragm.

14. (*New*) An ion analysis apparatus comprising:

a quadrupole ion trap, having four pole rods and a field with a frequency Ω, into which ions are introduced;

an ion ejection system that selectively ejects ions from the ion trap by superimposing higher multipole fields on the field of the ion trap that result in nonlinear resonance; and

a detector for detecting ions ejected from the ion trap.

15. (*New*) An ion analysis apparatus according to Claim 14 wherein the ion ejection system starts ejection of the ions by a dipolar excitation of frequency ω, where ω is an integer fraction of Ω or a small multiple thereof.

16. (*New*) An ion analysis apparatus according to Claim 15 wherein the frequency ω is equal to $\Omega/3$.

17. (*New*) An ion analysis apparatus according to Claim 15 wherein the phase of the dipolar excitation is locked to the phase of the field of the ion quadrupole trap, and wherein the phases are adjustable in relation to one another.

18. (*New*) An ion analysis apparatus according to Claim 14 wherein the higher multipole fields are generated by shaping pole rods asymmetrically.

19. (*New*) An ion analysis apparatus according to Claim 14 wherein the higher multipole fields are generated by dislocating the arrangement of the pole rods.

20. (*New*) An ion analysis apparatus according to Claim 14 wherein the higher multipole fields are generated by applying additional voltages of frequency Ω to the pole rods.